



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/738,403	12/17/2003	Janakiraman Vaidyanathan	67,097-033; EH-11026	8005

26096 7590 04/19/2007
CARLSON, GASKEY & OLDS, P.C.
400 WEST MAPLE ROAD
SUITE 350
BIRMINGHAM, MI 48009

EXAMINER

LEE, JOHN W

ART UNIT	PAPER NUMBER
----------	--------------

2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/738,403	VAIDYANATHAN, JANAKIRAMAN	
	Examiner	Art Unit	
	John Wahnkyo Lee	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>20060119</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. An initialed and dated copy of Applicant's IDS form, Paper No. 20060119, is attached to the instant Office action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 5, 7-9, and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shashua (5,821,943) in view of Park et al. ("Dual-Beam Structured-Light Scanning for 3-D Object Modeling").

Regarding claim 1, Shashua discloses using 3 CCD cameras to yield 3 respective perspectives of the object (fig. 12-200 and 210; col. 12, lines 55-65) and identifying point features in the image that corresponds to point features in 3D (col. 5, lines 64-66; col. 6, lines 1-2). Shashua teaches that the 2D images can be analyzed on a geometric level (col. 5, lines 57-58) and the geometrical relations between the corresponding set of 2D points and the set of 3D points from the cloud of points of the 3D world (col. 5, lines 66-67; col. 6, line 1-6). However, Shashua does not disclose

Art Unit: 2624

scanning the three dimension of the object, but Part does. Park uses a Dual-Beam structured-light scanner to scan the object (fig. 3; page 67, section 3.1)

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Park's method in Shashua's apparatus and method for recreating and manipulating a 3D object based on a 2D projection to provide an effective 3-D object bin picking and 3-D object modeling application from accurate and reliable data as suggested by Park (page 66, section 2).

Regarding claim 2, Shashua further discloses that the 2D images can be analyzed on a geometric and photometric level that is the radiometric relation between the scene and the luminosity such, the pixel grey values (col. 15, lines 55-65). Park further discloses scanning the three dimension of the object using a Dual-Beam structured-light scanner to scan the object (fig. 3; page 67, section 3.1).

Regarding claim 3, Shashua further discloses using 3 CCD cameras to yield 3 respective perspectives of the object (fig. 12-200 and 210; col. 12, lines 55-65).

Regarding claim 5, Shashua further discloses matching point finder (fig. 6-40, 11-240) that operates to identify at least 7 and preferably a multiplicity of matching points from the 3 digital views (col. 10, lines 45-48; col. 13, lines 6-8). The CAD model information generated by CAD S/W (fig. 11-290) from each image triplet is stored in a suitable memory (fig. 11-300; col. 13, lines 9-11). A computational unit (fig. 11-320) compares the output unit to a reference CAD model and computes difference (col. 13, lines 17-19).

Regarding claim 7, Parker further discloses a Dual-Beam structured-light scanner to scan the object (fig. 3; page 67, section 3.1) that is an example of a laser projector and generates illuminated stripes (page 67, section 3-1).

Regarding claim 8, Shashua further discloses the CCD cameras attached to a robot arm (fig. 11-212) that can move relative to a work piece (col. 12, lines 50-52).

Regarding claim 9, claim 9 is a method claim corresponding to the claim 1 that is a claim of modeling system for modeling an object. Refer to the explanation of claim 1.

Regarding claim 10, claim 10 is a method claim corresponding to the claim 5 that is a claim of modeling system for modeling an object. Refer to the explanation of claim 5.

Regarding claim 12, claim 12 is a method claim corresponding to the claim 7 that is a claim of modeling system for modeling an object. Refer to the explanation of claim 7.

Regarding claim 13, Park further discloses DSLS system that comprises two beam light scanner, left and right. Each of the left and right light scanners generates illuminated stripes, and illuminated stripes generated from the left light scanner do not overlap with illuminated stripes generated from the right scanner (page 67, section 3.1).

Regarding claim 14, Shashua further discloses identifying point features in the image that correspond to point features in 3D (col. 5, line 67; col. 6, line 1). Park teaches transforming two ranges of map detected from the two light scanners to set of points (page 69, section 4). Park also further discloses the superposition of cloud of points detected by the left projector and the right projector (fig. 5).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shashua (5,821,943) in view of Park et al. ("Dual-Beam Structured-Light Scanning for 3-D Object Modeling"), and further in view of Nasar et al. (US 5,144,685).

Regarding claim 4, Shashua and Park disclose and teach all the previous claim limitations except the detail claim limitations of claim 4. However, Nasar discloses a first processor, that is connected to a camera to process the images into an image model having segmented regions, extracted objects and features, and a third processor that connected to the first and second processor, that outputs expected site models, to match expected site models and features from the second processor to extracted objects and features from first processor (claim 1).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Park's method and Nasar's apparatus in Shashua's apparatus and method for recreating and manipulating a 3D object based on a 2D projection to provide more feasible method for recognition and verification and to make it able to observe more details of objects as suggested by Nasar (col. 2, lines 13-15).

5. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shashua (5,821,943) in view of Park et al. ("Dual-Beam Structured-Light Scanning for 3-D Object Modeling"), and further in view of Migdal et al. (US 5,995, 650).

Regarding claims 6 and 11, Shashua and Park disclose and teach all the previous claim limitations except the detail claim limitations of claims 6 and 11. However, Migdal discloses correction matrix (fig. 3A-225). Migdal's invention recognizes

Art Unit: 2624

that distortions in the collected laser beam information can result from problems with the image collector (fig. 1-118). By comparing the reconstructed X, Y, and Z points to the known X, Y, and Z points a specific correction matrix is generated for the image collector (col. 17, lines 67; col. 18, lines 1-13).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Park's method and Migdal's apparatus in Shashua's apparatus and method for recreating and manipulating a 3D object based on a 2D projection to refine the data for better 3D accuracy as suggested by Migdal (col. 17, lines 65-67).

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shashua (5,821,943) in view of Park et al. ("Dual-Beam Structured-Light Scanning for 3-D Object Modeling"), and further in view of Horikawa et al. (US 4,638,156).

Regarding claim 15, Shashua and Park disclose and teach all the previous claim limitations except the detail claim limitations of claim 15. However, Horikawa discloses a light beam scanning apparatus including a control circuit that detects a scan speed of the light beam based on the second signal and adjusts the first signal in response to the detected scan speed to control the scan speed of the light beam such that the detected scan speed substantially coincides with a predetermined speed (abstract).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Park's method and Horikawa's apparatus in Shashua's apparatus and method for recreating and manipulating a 3D object based on

a 2D projection to provide a light beam scanning apparatus requiring minimum manual adjustment in which optimal scanning conditions can be automatically set up and held as suggested by Horikawa (col. 1, lines 63-66).

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shashua (5,821,943) in view of Park et al. ("Dual-Beam Structured-Light Scanning for 3-D Object Modeling"), and further in view of Fabio Remondino ("3-D reconstruction of articulated objects from uncalibrated images").

Regarding claim 15, Shashua and Park disclose and teach all the previous claim limitations except the detail claim limitations of claim 16. However, Remondino teaches automated matching process and a filter to reduce the density of the point and remove big outliers (page 152, section 3).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Park's method and Remondino's method in Shashua's apparatus and method for recreating and manipulating a 3D object based on a 2D projection to produce a dense and robust set of corresponding image points, to reduce the noise in the 3-D data, and to get a more uniform density of the point cloud as suggested by Remondino (page 152, section 3).

Conclusion

8. No claims are allowed.

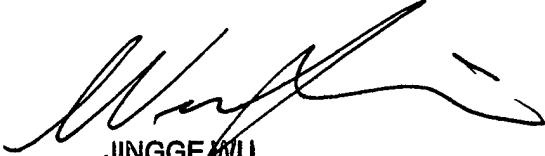
Art Unit: 2624

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Wahnkyo Lee whose telephone number is (571) 272-9554. The examiner can normally be reached on Monday - Friday (Alt.) 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John W. Lee


JINGGE WU
SUPERVISORY PATENT EXAMINER